REMARKS/ARGUMENTS

In the Office Action mailed July 10, 2003, claims 1-16, 32-36, and 38 were examined. Claim 38 was rejected under 35 U.S.C. § 102(e), as allegedly anticipated by, or, in the alternative, under 35 U.S.C. § 103(a), as allegedly obvious over U.S. Patent No. 6,060,549 to Li et al. ("the Li patent"). In addition, claims 1-4, 9-14, 16, and 32 were rejected under 35 U.S.C. § 103(a), as allegedly obvious over U.S. Patent No. 6,117,025 to Sullivan ("the Sullivan patent"), and optionally in view of the Encyclopedia of Chemical Technology ("Encyclopedia of Chem. Tech.") and the Encyclopedia of Polymer Science and Engineering ("Encyclopedia of Poly. Science"). Furthermore, claims 1-4, 9-14, 16, and 32 were rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over the Sullivan patent in view of U.S. Patent No. 4,894,411 to Okada et al. ("the Okada patent"). Lastly, claims 5-8, 15, and 33-36 were objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form.

Applicants respectfully traverses the rejections of the claims, for the reasons set forth below.

The Invention

Before addressing the specific claim rejections, it will be helpful first to briefly summarize the invention of the pending claims.

The present invention is embodied in golf balls incorporating nanocomposite and/or nanofiller material in their cores, outer cover layers, or, if present, intermediate layers. The nanocomposite material includes a polymer, such as polyamide, ionomer, polycarbonate, polyurethane, polystyrene, polyethylene, fluoropolymer, polyamide elastomer, thermoplastic polyolefin, polyester elastomer, polyester, polyolefin, thermoplastic elastomer, thermoplastic vulcanizate, and epoxy resin, or mixtures of these. Substantially evenly dispersed within and reacted into the structure of this polymer are particles of inorganic material. The largest dimension of these particles is one micron or smaller, and this largest dimension is at least an order of magnitude greater than the smallest dimension of the particles. The particles preferably consist essentially of clay, such as hydrotalcite, montmorillonite, micafluoride, or octosilicate.

The nanofiller material consists of these inorganic particles themselves, without incorporation into polymer.

In one aspect of the invention, nanocomposite material is present in an amount ranging from about 1% to 50% by weight of the cores, covers, or intermediate layers of the golf balls embodying the present invention, more preferably from about 1% to 40% by weight, and most preferably from about 5% to 30% by weight. In another aspect of the invention, nanofiller material is present in an amount ranging from about 0.1% to 20% by weight of the cores, covers, or intermediate layers of the golf balls embodying the present invention, more preferably from about 0.1% to 15% by weight, and most preferably from about 0.1% to 10% by weight.

The present invention also is embodied in a golf ball having a cover layer incorporating 10% to 20% of a nanocomposite material that includes a polyamide and inorganic phillosilicate particles of dimension as described above. In one embodiment of the invention, the golf ball cover can include an amide block copolymer, particularly a polyether amide block copolymer. In another embodiment of the invention, the golf ball cover can include a block copolymer comprising a first polymer block comprising an aromatic vinyl compound, a second polymer block comprising a conjugated diene compound, and a hydroxyl group located at a terminal block copolymer.

The present invention also is embodied in a golf ball incorporating both nanocomposite and nanofiller materials and also in methods for making a composition for use in golf balls that include nanocomposite or nanofiller materials.

The Rejection of Claim 38 Based on the Li Patent

On page 2 of the Office Action, independent claim 38 was rejected under 35 U.S.C. § 102(e), as allegedly anticipated by, or, in the alternative, under 35 U.S.C. § 103(a), as allegedly obvious over the Li patent. Applicants has canceled claim 38 without prejudice and, thus, the Examiner's rejections to that claim are moot.

The Rejection of Claims 1-4, 9-14, 16, and 32 Based on the Sullivan Patent and the Encyclopedia of Chem. Tech. or the Encyclopedia of Poly. Science

On page 2 of the Office Action, independent claims 1 and 32, and dependent claims 2-4, 9-14, and 16 were rejected under 35 U.S.C. § 103(a), as allegedly obvious over the Sullivan patent, and optionally in view of the Encyclopedia of Chem. Tech. or the Encyclopedia of Poly. Science. Applicants respectfully traverses this rejection.

Regarding the Sullivan patent, the Examiner on pages 2 and 3 of the Office Action stated:

> Sullivan suggests fillers such as clay (col. 11 line 51) in the inner and outer cover layers of golf balls (col. 11 line 28). Coupling agents may be used to couple the filler to resin (col. 10 line 57). This qualifies as Applicants's "reacted" limitation. The cover can be polyamide (col. 7 line 17).

Applicants disagree. It would not have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of the Sullivan patent to result in the claimed invention in the instant application. Although the Examiner states that the Sullivan patent suggests using "fillers such as clay in the inner and outer cover layers of golf balls," the Sullivan patent makes no mention of using nanocomposite material, or clay meeting the definition of nancomposite material, as fillers. On page 3 of the Office Action, the Examiner even admits that "Sullivan does not teach Applicants's preferred technique of combining the clay and polyamide into a nanocomposite." In fact, the Sullivan patent teaches away from using nanocomposite material as fillers. First, at Column 11, lines 2-9, the Sullivan patent discloses that non-reinforcing fillers are preferred over reinforcing fillers. However, non-reinforcing fillers are known to have low aspect ratios, while nanocomposites are known to have high aspect ratios. In addition, the Sullivan patent discloses adding a coupling agent to the polymer in order to "couple a filler to a resin composition." (see Sullivan, col. 10, lines 55-58.) This suggests that the fillers disclosed in the Sullivan patent lack a coupling agent prior to this step. Yet, as disclosed on page 11, line 7 of Applicants's specification, nanocomposites have a coupling agent pre-coated onto the particles. Thus, the Sullivan patent teaches away from using clays such as nanocomposites, which have high aspect ratios and are pre-coated with a coupling agent.

On page 3 of the Office Action, the Examiner also cites to the Encyclopedia of Chem. Tech. and the Encyclopedia of Poly. Science stating:

> Sullivan does not report the precise dimensions of his clay, but it is known that clays are "platey" (i.e., high L/D ratio) and can have a largest dimension within Applicants's range (see Encyclopedia of Chemical Technology and Encyclopedia of Polymer Science). It appears many typical clays (treated with coupling agent) meet Applicants's requirements. It would have been obvious to use such clay in Sullivan's ball.

Applicants disagree. It would not have been obvious to one of ordinary skill in the art at the time the invention was made to combine and modify the teachings of the Sullivan patent with the Encyclopedia of Chem. Tech. and the Encyclopedia of Poly. Science to result in the claimed invention of the instant application. First, on page 3 of the Office Action, the Examiner admits that the Sullivan patent does not disclose using nanocomposites. Second, neither the Encyclopedia of Chem. Tech. nor the Encyclopedia of Poly. Science discloses particles having a largest dimension within the range required by independent claims 1 and 32. Specifically, claims 1 and 32 require that the particles have a largest dimension of about one micron or less, and a largest dimension that is at least an order of magnitude greater than the particles' smallest dimension. Yet, the Encyclopedia of Chem. Tech. discloses that the "median particle size" for Kaolin type clay is "0.2 to 1.0 microns (μm)", which reflects the average size of the particle's smallest dimension. (Encyclopedia of Chem. Tech., p. 416.) Thus, for the largest dimension of the particles (disclosed in the Encyclopedia of Chem. Tech.) to be an order of magnitude greater than the smallest dimension, the particles would have to have a largest dimension of at least two microns, which is outside of the range recited in claims 1 and 32.

The Encyclopedia of Poly. Science also discloses Kaolin type clay particles, but states a size range of 0.3 to 5 microns (μm). (Encyclopedia of Poly. Science, p. 54.) Again, the particles would need a largest dimension of at least 3.0 microns (μm) for the largest dimension to be ten times larger than the smallest dimension. In addition, on page 54 of the Encyclopedia of Poly. Science, it discloses that most clay particles consist of stacks or books of platelets, wherein a stack of just two platelets would reduce the width to four to six times the thickness. And, the particles usually consist of two, three, or four platelets, which reduces the ratio of the dimensions

accordingly. Thus, the clay particles disclosed in the Encyclopedia of Poly. Science clearly fall outside of the limitations recited in independent claims 1 and 32, which require the largest dimension to be at least ten times greater than the smallest dimension. In fact, none of the references cited by the Examiner disclose the use of nanocomposites, or clay, within the range required by independent claims 1 and 32. For this reason, the § 103 rejection of independent claims 1 and 32, and dependent claims 2-4, 9-14, and 16 is improper and should be withdrawn.

The Rejection of Claims 1-4, 9-14, 16, and 32 Based on the Sullivan and Okada Patents

On page 3 of the Office Action, independent claims 1 and 32; and dependent claims 2-4, 9-14, and 16, were rejected under 35 U.S.C. § 103(a), as allegedly being unpatentable over the Sullivan patent in view of the Okada patent. Applicants respectfully traverses these rejections.

Regarding the Sullivan and Okada patents, the Examiner on page 3 of the office action stated:

> Sullivan suggests fillers such as clay (Col. 11 line 51) in the inner and outer covers of golf balls (col. 11 line 28). The covers may be polyamide (col. 7 line 17). Sullivan does not teach Applicants's preferred technique of combining the clay and polyamide into a "nanocomposite."
>
> Okada teaches such a technique results in improved mechanical strength and toughness. . . . It would have been obvious to use Okada's superior clay/polyamide nanocomposite as the clay/polyamide covers suggested by Sullivan.

Applicants disagree. It would not have been obvious to one of ordinary skill in the art at the time the invention was made to combine and modify the teachings of the Sullivan and Okada patents to result in the claimed invention of the instant application. On page 3 of the Office Action, the Examiner states that the Sullivan patent teaches the use of fillers such as clay in the outer and inner covers of golf balls, but admits that the Sullivan patent does not teach the use of nanocomposites. And, although the Examiner cites to the Okada patent for a method of making nanocomposites, there is no motivation to combine the Sullivan and Okada patents. The Okada patent discloses the use of nancomposite material in automotive and electronic parts. (see

Okada, col. 1, lines 50-68.) Whereas, the Sullivan patent is directed at multi-layer golf balls. (see Sullivan, col. 1, lines 13-15.) Accordingly, the Sullivan and Okada patents are directed at completely different technologies. Thus, there is no motivation to combine the teachings of the Sullivan and Okada patents to result in the claimed invention of the instant Applicants. For this reason, the § 103(a) rejection of independent claims 1 and 32, and dependent claims 2-4, 9-14, and 16 is improper and should be withdrawn.

Allowable Subject Matter

On page 3 of the Office Action, the Examiner objected to claims 5-8, 15, and 33-36 as "being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims." As discussed above, the rejection of independent claims 1 and 32 is improper and should be withdrawn. Thus, dependent claims 5-8, 15, and 33-36, which depend from claims 1 and 32, are allowable for the same reasons that independent claims 1 and 32 are allowable.

Conclusion

This application should now be in condition for a favorable action. Allowance of the application is respectfully requested. If for any reason the Examiner finds the application other than in allowance, the Examiner is requested to call the undersigned attorney at the below-indicated telephone number to discuss the steps necessary for placing the application in condition for allowance. If there are any fees due in connection with the filing of this Amendment, please charge the fees to our Deposit Account No. 19-1853.

Respectfully submitted,
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